42.P22633 PCT

PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

To:
GORODISSKY & PARTNERS LIMITED
Attn. Egorova, Galina B.
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Stroenie 3
Moscow, 129010
FEDERATION DE RUSSIE

Date G&P: 02/10/2006

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PCT

NOTIFICATION OF TRANSMITTAL OF THE INTERNATIONAL SEARCH REPORT AND THE WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY, OR THE DECLARATION

(PCT Rule 44.1)

Applicant's or agent's file reference 2420-300680 RU/081	Date of mailing *(day/month/year)* 21/09/2006
International application No. PCT/RU2005/000561	**FOR FURTHER ACTION** See paragraphs 1 and 4 below
Applicant INTEL CORPORATION	International filing date *(day/month/year)* 14/11/2005

1. [x] The applicant is hereby notified that the international search report and the written opinion of the International Searching Authority have been established and are transmitted herewith.

   Filing of amendments and statement under Article 19:
   The applicant is entitled, if he so wishes, to amend the claims of the International Application (see Rule 46):

   When? The time limit for filing such amendments is normally two months from the date of transmittal of the International Search Report.

   Where? Directly to the International Bureau of WIPO, 34 chemin des Colombettes 1211 Geneva 20, Switzerland, Fascimile No.: (41-22) 338.82.70

   For more detailed instructions, see the notes on the accompanying sheet.

2. [ ] The applicant is hereby notified that no international search report will be established and that the declaration under Article 17(2)(a) to that effect and the written opinion of the International Searching Authority are transmitted herewith.

3. [ ] **With regard to the protest** against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:

   [ ] the protest together with the decision thereon has been transmitted to the International Bureau together with the applicant's request to forward the texts of both the protest and the decision thereon to the designated Offices.

   [ ] no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4. **Reminders**

   Shortly after the expiration of **18 months** from the priority date, the international application will be published by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau as provided in Rules 90*bis*.1 and 90*bis*.3, respectively, before the completion of the technical preparations for international publication.

   The applicant may submit comments on an informal basis on the written opinion of the International Searching Authority to the International Bureau. The International Bureau will send a copy of such comments to all designated Offices unless an international preliminary examination report has been or is to be established. These comments would also be made available to the public but not before the expiration of 30 months from the priority date.

   Within **19 months** from the priority date, but only in respect of some designated Offices, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase **until 30 months** from the priority date (in some Offices even later); otherwise, the applicant must, **within 20 months** from the priority date, perform the prescribed acts for entry into the national phase before those designated Offices.

   In respect of other designated Offices, the time limit of **30 months** (or later) will apply even if no demand is filed within 19 months.

   See the Annex to Form PCT/IB/301 and, for details about the applicable time limits, Office by Office, see the *PCT Applicant's Guide*, Volume II, National Chapters and the WIPO Internet site.

Name and mailing address of the International Searching Authority European Patent Office, P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Authorized officer Tatjana Nebesky

NOTES TO FORM PCT/ISA/220

These Notes are intended to give the basic instructions concerning the filing of amendments under article 19. The Notes are based on the requirements of the Patent Cooperation Treaty, the Regulations and the Administrative Instructions under that Treaty. In case of discrepancy between these Notes and those requirements, the latter are applicable. For more detailed information, see also the *PCT Applicant's Guide*, a publication of WIPO.

In these Notes, "Article", "Rule", and "Section" refer to the provisions of the PCT, the PCT Regulations and the PCT Administrative Instructions, respectively.

INSTRUCTIONS CONCERNING AMENDMENTS UNDER ARTICLE 19

The applicant has, after having received the international search report and the written opinion of the International Searching Authority, one opportunity to amend the claims of the international application. It should however be emphasized that, since all parts of the international application (claims,description and drawings) may be amended during the international preliminary examination procedure, there is usually no need to file amendments of the claims under Article 19 except where, e.g. the applicant wants the latter to be published for the purposes of provisional protection or has another reason for amending the claims before international publication. Furthermore, it should be emphasized that provisional protection is available in some States only (see *PCT Applicant's Guide*, Volume I/A, Annexes B1 and B2).

The attention of the applicant is drawn to the fact that amendments to the claims under Article 19 are not allowed where the International Searching Authority has declared, under Article 17(2), that no international search report would be established (see *PCT Applicant's Guide*, Volume I/A, paragraph 296).

What parts of the international application may be amended?

Under Article 19, only the claims may be amended.

During the international phase, the claims may also be amended (or further amended) under Article 34 before the International Preliminary Examining Authority. The description and drawings may only be amended under Article 34 before the International Examining Authority.

Upon entry into the national phase, all parts of the international application may be amended under Article 28 or, where applicable, Article 41.

When? Within 2 months from the date of transmittal of the international search report or 16 months from the priority date, whichever time limit expires later. It should be noted, however, that the amendments will be considered as having been received on time if they are received by the International Bureau after the expiration of the applicable time limit but before the completion of the technical preparations for international publication (Rule 46.1).

Where not to file the amendments?

The amendments may only be filed with the International Bureau and not with the receiving Office or the International Searching Authority (Rule 46.2).

Where a demand for international preliminary examination has been/is filed, see below.

How? Either by cancelling one or more entire claims, by adding one or more new claims or by amending the text of one or more of the claims as filed.

A replacement sheet must be submitted for each sheet of the claims which, on account of an amendment or amendments, differs from the sheet originally filed.

All the claims appearing on a replacement sheet must be numbered in Arabic numerals. Where a claim is cancelled, no renumbering of the other claims is required. In all cases where claims are renumbered, they must be renumbered consecutively (Section 205(b)).

The amendments must be made in the language in which the international application is to be published.

What documents must/may accompany the amendments?

Letter (Section 205(b)):

The amendments must be submitted with a letter.

The letter will not be published with the international application and the amended claims. It should not be confused with the "Statement under Article 19(1)" (see below, under "Statement under Article 19(1)").

The letter must be in English or French, at the choice of the applicant. However, if the language of the international application is English, the letter must be in English; if the language of the international application is French, the letter must be in French.

PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference	**FOR FURTHER ACTION**	see Form PCT/ISA/220 as well as, where applicable, item 5 below.
2420-300680		
International application No.	International filing date *(day/month/year)*	(Earliest) Priority Date *(day/month/year)*
PCT/RU2005/000561	14/11/2005	
Applicant		
INTEL CORPORATION		

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 4 sheets.

[X] It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**
   a. With regard to the **language,** the international search was carried out on the basis of:
      [X] the international application in the language in which it was filed
      [ ] a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))
   b. [ ] With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see Box No. I.

2. [ ] **Certain claims were found unsearchable** (See Box No. II)

3. [ ] **Unity of invention is lacking** (see Box No III)

4. With regard to the **title,**
   [X] the text is approved as submitted by the applicant
   [ ] the text has been established by this Authority to read as follows:

NO DOCKETING REQUIRED
N A

5. With regard to the **abstract,**
   [X] the text is approved as submitted by the applicant
   [ ] the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority

6. With regard to the **drawings,**
   a. the figure of the **drawings** to be published with the abstract is Figure No. 18
      [ ] as suggested by the applicant
      [X] as selected by this Authority, because the applicant failed to suggest a figure
      [ ] as selected by this Authority, because this figure better characterizes the invention
   b. [ ] none of the figures is to be published with the abstract

INTERNATIONAL SEARCH REPORT

International application No
PCT/RU2005/000561

A. CLASSIFICATION OF SUBJECT MATTER
INV. G06T7/00 G06F11/36

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
G06T G06F G06K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	"EGGPLANT TUTORIAL, FOR USE WITH A MAC OS X SYSTEM-UNDER-TEST, EGGPLANT VERSION 3.1" 3 June 2005 (2005-06-03), REDSTONE SOFTWARE INC. , LAFAYETTE, CO, USA , XP002397141 * pages 1-18 *	1-21
X	ANONYMOUS: "Software Automation & Testing" REDSTONE SOFTWARE INC., 27 June 2004 (2004-06-27), XP002383091 cited * pages 1-19 *	1-21
X	HERRON D: "Accessibility for test automation" WEBLOGS.JAVA.NET, 19 July 2005 (2005-07-19), XP002388052 * pages 1-3 *	1-21

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[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
31 August 2006	21/09/2006

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Borotschnig, H

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Form PCT/ISA/210 (second sheet) (April 2005)

INTERNATIONAL SEARCH REPORT

International application No
PCT/RU2005/000561

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 335 342 A (POPE ET AL) 2 August 1994 (1994-08-02) * abstract, Fig. 3,5,6A,6B, cols. 1, 5, claims 1,8 *	1-21
A	US 2004/194065 A1 (MCGRATH FRANK ET AL) 30 September 2004 (2004-09-30) * abstract, paragraphs [0006,0007,0016,0024-0027], claim 10	

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/RU2005/000561

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5335342 A	02-08-1994	NONE	
US 2004194065 A1	30-09-2004	NONE	

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:

see form PCT/ISA/220

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43*bis*.1)

Date of mailing
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference
see form PCT/ISA/220

FOR FURTHER ACTION
See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/RU2005/000561	14.11.2005	

International Patent Classification (IPC) or both national classification and IPC
INV. G06T7/00 G06F11/36

Applicant
INTEL CORPORATION

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notifed the International Bureau under Rule 66.1*bis*(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA:	Date of completion of this opinion	Authorized Officer
European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	see form PCT/ISA/210	Borotschnig, Hermann Telephone No. +49 89 2399-7459

Box No. I Basis of the opinion

1. With regard to the **language**, this opinion has been established on the basis of:

   ☒ the international application in the language in which it was filed

   ☐ a translation of the international application into , which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1 (b)).

2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:

   a. type of material:

      ☐ a sequence listing

      ☐ table(s) related to the sequence listing

   b. format of material:

      ☐ on paper

      ☐ in electronic form

   c. time of filing/furnishing:

      ☐ contained in the international application as filed.

      ☐ filed together with the international application in electronic form.

      ☐ furnished subsequently to this Authority for the purposes of search.

3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

4. Additional comments:

Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	1-21 (but see Item V)
	No:	Claims	
Inventive step (IS)	Yes:	Claims	
	No:	Claims	1-21
Industrial applicability (IA)	Yes:	Claims	1-21
	No:	Claims	

2. Citations and explanations

see separate sheet

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1 Reference is made to the following documents of the international search report:

D1: XP-2 397 141, Eggplant Version 3.1 Tutorial, 3 June 2005
D2: XP-002388052, David Herron's Blog, "Accessibility for test automation"
D3: US-A-5 335 342, (Tiburon Systems Inc.), 1994-08-02

2 The following clarity problems have to be addressed first:

2.1 Claims 1,8,15 have been drafted as separate independent claims apparently relating to very similar subject-matter but differing from each other widely with regard to the definition of the subject-matter for which protection is sought and, most notably, in respect of the terminology used for the features of that subject-matter. The aforementioned claims therefore lack clarity when read in their entirety. In order to overcome this objection it would be necessary to closely harmonise the wording of the independent claims.

2.2 The term contour arises first in claims 5,12,19 and thus lacks antecedent support in claims 6,7,13,14,20,21. The category of claim 21 is "system".

2.3 The following expressions of claims 1,8,15 are unclear/vague/have no commonly recognised/unique technical meaning and thus have to be clarified in the claims based on the definitions given in the description:

1. "structural content filtration" - what is "structural content"/"content" of what ?
2. "active object" - what is "active" ? "object" of what ? is it the "object to be searched for" ?
3. "recorded image generated by a graphical user interface" - what is the role of the GUI exactly ? what is the meaning of "recorded" here ?
4. "playback image" - what is played back ? why is there an "image" ?
5. "subset" - why "sub"-set ? (lack of antecedent support)
6. what steps are automatic/what steps require user input ?

7. how do the claimed steps relate to the wanted automated control of the application software ?

In order to further explicate the above objection the following exemplary wording of claims 1,8,15 - which would overcome the objection - is presented: (example for claim 1, corresponding examples for claims 8,15 implied):

"*An automated computer implemented method of structural content filtration to reduce the number of hypotheses for the location of an active object of a graphical user interface GUI in an image of said GUI in order to automatically control, based on user activity recorded during a recording phase, execution of the application program having said GUI during a playback phase, said method comprising:*

- *recording an image depicting GUI objects, including said active object, displayed by said application program during said interactive recording phase,*
- *transforming the recorded image and a corresponding playback image of said GUI captured during said playback phase;*
- *determining a sub-image from the recorded image which corresponds to said active object to be searched for in the transformed playback image;*
- *determining a set of points on the transformed playback image which have appropriate values for matching the sub-image; and*
- *filtering location hypotheses on the playback image which are more than a selected distance from any point in said set in order to identify the GUI object to be activated next to continue playback.*"

2.4 Without the clarification in the last sentence the subject matter of claims 1,8,15 could also be misunderstood and accidentally read on comparing areas of the test screen shots to the playback screens hot areas in order to identify the differences due to software bugs (cf. D3, claim 1).

2.5 For the following the subject matter of claims 1,8,15 will be interpreted as if already clarified.

3 The claimed subject matter lacks an inventive step for the following reasons:

LACK OF INVENTIVE STEP W.R.T. HUMAN BEHAVIOUR:

3.1 The claimed subject matter of claims 1,8 and 15 can be compared with the operation of a human operator performing manual testing sessions of developed computer applications. Indeed this is explicitly admitted on pg. 2 line 30-pg. 3 line 4. Claimed subject matter amounting to nothing more than the mere idea of automating human behaviour does not involve any inventive activity, in particular:

3.2 Considering that previous research in the area of image recognition has been strongly inspired by human vision and that existing program analysis systems also already use image recognition techniques (see section "Description" on pg. 1 of the present application), it was an obvious aim to design a computer-implemented method/system for GUI testing by searching for an active GUI object by automating steps which a human being would perform in a similar situation (replacing the human tester by an equivalent machine).

3.3 The closest prior art is taken to be the way a human would memorize and re-execute graphical user input in order to control a computer program.

Assume, for example, that a person is taught a sequence of commands on one screen e.g. in a course or through a demo/tutorial, or upon being instructed on how to carry out a manual software test. Most persons will visually memorize the appearance of the GUI and the appearance of the buttons which have to be clicked. When it comes to replay this sequence of events, e.g. at the own computer, the person will try to match the memorized pictures with the GUI as it currently appears in order to re-click the buttons in the right order.

Note that the person's computer might well have a screen of different size/colour scheme etc. and thus the memorized picture and the currently seen picture would have to be mentally transformed to take account of these trivial differences in appearance.

Note also that the person would mentally "determine a set of points", namely those points in the current screen image which match the appearance of the memorized

active button sub-image of the screens hot image.

Finally, note that filtering hypotheses arises naturally and frequently in human and in machine recognition. For example, if the person should have partially forgotten which button was the right one during training then the overall layout and its distances constitute a common visual cue for hypotheses filtering. For example: "The button was in the upper left during training (recording) so I expect it to be there again and I wont click on one of the more distant buttons during actual working sessions (playback)".

3.4 Thus, the features of claim 1 (and accordingly also those of claims 8 and 15) are merely those which a skilled person would make a machine perform in order to correspond to the way a human being would accomplish the same task of "extracting" and re-finding "objects" within his field of vision. Thus, the claimed method amounts to nothing more than the mere idea of automating human behaviour and hence does not involve an inventive step (Article 56 EPC).

3.5 The above analysis also extends to the subject matter of dependent claims 2-7,9-14,16-21: it is a well documented fact of perception research that human beings also use the visual outline of objects when recognising them: hence the corresponding use of contours (edges) is trivial. So is the transforming into "black/white" as most human beings do not memorise the colours anyway, and, moreover, not disregarding color would evidently render the approach non robust w.r.t. changes in user selected color schemes. Finally, "black/white" renderings are most common during OCR which would also be a standard algorithm most usefully employed on the text parts of the subimages.

LACK OF INVENTIVE STEP W.R.T. PRIOR ART DOCUMENTS:

3.6 In the present case, it is also possible to alternatively argue as follows:

3.7 Prior art document D1 ("eggplant™") teaches capturing GUI image areas and saving them as templates during recording. During playback these image areas are searched in the playback screen image, and the corresponding active objects of the

GUI are activated if a match between a region in the playback image and the recorded captured template can be found (see, for example, "The Finished Script" on pg 16). Alternatively, one could start from D2 ("post by robogeed on July 25, 2005 at 7:38 AM") or also from D3 (claim 8 and col. 5 lines 25-51) as closest prior art.

3.8 Hence, the closest prior art might be interpreted as differing from the subject matter of claims 1,8,15 basically in that it does not teach filtering of hypotheses on the playback image which are more than a selected distance from any of the subset of points.

3.9 The technical problem would thus be: improve the template matching used in D1.

3.10 Recognising this problem does not constitute by itself an inventive step. Correct template matching being crucial for the success of D1, it is evident that making it as robust as possible is highly desirable.

3.11 The solution recited in claims 1,8,15 also does not involve an inventive step. Note that the close similarity of the task at hand (re-locating sub-regions of a previous image in a later subsequent image) to the general problems encountered in image registration and in tracking image regions is palpable. Adding a step of filtering among multiple hypotheses based on further cues is a standard technique in computer vision in general, and in particular so in tracking and in image registration. Moreover, distances are also commonly employed for that purpose, i.e. to eliminate wrong template matches in image registration and tracking. Hence, in the present context, using the distances among the objects of the GUI for hypothesis filtering constitutes an obvious solution that is obtained through entirely routine-reasoning within the framework of the normal progress of technology.